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Claims (Amended)

1. A toner for developing an electrostatic image comprising toner particles which include a binder resin, a wax and a colorant, wherein the wax has a melting point of between 50 and 150°C, and the wax exists in the toner particles in domains of 2 µm or less mean particle size and wherein
(a) the mean circularity of the toner particles as measured by a Flow Particle Image Analyser is at least 0.90;
(b) the shape factor, SF1, of the toner particles is in the range from 130 to 150; and
(c) the ratio SF1/SF2 of the shape factor, SF1, to the shape factor, SF2, is from 1.07 to 1.13.

2. A toner according to Claim 1 wherein the mean circularity of the toner particles is in the range from 0.93 to 0.99.

3. A toner according to Claim 2 wherein the mean circularity of the toner particles is in the range from 0.94 to 0.96.

4. A toner according to any one preceding claim wherein SF1 of the toner particles is at most 145.

5. A toner according to Claim 4 wherein SF1 of the toner particles is in the range from 135 to 145.

6. A toner for developing an electrostatic image comprising toner particles which include a binder resin, a wax and a colorant, wherein the wax has a melting point of between 50 and 150°C, and the wax exists in the toner particles in domains of 2µm or less mean particle size and wherein
(a) the mean circularity of the toner particles as measured by a Flow Particle Image Analyser is in the range from 0.94 to 0.96;
(b) the shape factor, SF1, of the toner particles is in the range from 135 to 145; and
(c) SF1 > SF2.

7. A toner according to any one preceding claim wherein SF2 of the toner particles is in the range from 120 to 140.

8. A toner according to Claim 7 wherein SF2 of the toner particles is in the range from 125 to 135.

9. A toner according to any one of the preceding Claims wherein the BET surface area of the toner particles before any optional blending with surface additives is 0.5-1.5

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m^2/g.

10. A toner according to Claim 9 wherein the BET surface area of the particles is 0.6-1.3 m^2/g.

11. A toner according to Claim 10 wherein the BET surface area of the particles is 0.7-1.1 m^2/g.

12. A toner according to Claim 11 wherein the BET surface area of the particles is 0.9-1.0 m^2/g

13. A toner according to any one of the preceding Claims wherein the binder resin has a ratio of weight average molecular weight (Mw) to number average molecular weight (Mn) of at least 3.

14. A toner according to Claim 13 wherein the ratio Mw/Mn is at least 5.

15. A toner according to Claim 14 wherein the ratio Mw/Mn is at least 10.

16. A toner according to any one of the preceding Claims wherein the wax exists in the toner in domains of mean diameter 1.6µm or less.

17. A toner according to any one of the preceding Claims wherein the binder resin is prepared from at least one latex containing a resin having a monomodal molecular weight distribution and at least one latex containing a resin having a bimodal molecular weight distribution.

18. A toner according to Claim 17 wherein the monomodal molecular weight resin is a low molecular weight resin and has a number average molecular weight of from 3000 to 10000.

19. A toner according to Claim 18 wherein the monomodal molecular weight resin has a number average molecular weight of from 3000 to 6000.

20. A toner according to any of Claims 17-19 wherein the bimodal resin has a weight average molecular weight of from 100,000 to 500,000.

21. A toner according to Claim 20 wherein the bimodal resin has a weight average molecular weight of from 200,000 to 400,000.

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22. A toner according to any one of the preceding Claims wherein the resin comprises a copolymer of (i) a styrene or substituted styrene, (ii) at least one alkyl acrylate or methacrylate and (iii) an hydroxy-functional acrylate or methacrylate.

23. A toner according to any one of the preceding Claims wherein the wax has a melting point of from 50 to 130°C.

24. A toner according to claim 23 wherein the wax has a melting point of from 50 to 110 °C.

25. A toner according to claim 24 wherein the wax has a melting point of from 65 to 85 °C.

26. A toner according to any one of the preceding Claims wherein the wax comprises a wax selected from the group consisting of: a polyethylene wax, a paraffin wax, a Fischer-Tropsch wax and an ester wax, including Carnauba wax.

27. A toner according to any one of the preceding Claims wherein the amount of wax incorporated in the toner is from 1 to 30 wt% based on the total weight of toner.

28. A toner according to Claim 27 wherein the amount of wax is from 3 to 20 wt%.

29. A toner according to Claim 28 wherein the amount of wax is from 5 to 15 wt%.

30. A toner according to any of the preceding Claims which further comprises a charge control agent.

31. A toner according to claim 30 wherein the charge control agent is colourless.

32. A process for forming an image, the process comprising developing an electrostatic image using a toner according to any one of the preceding claims, wherein the haze at a print density of 1.0 mg/cm^2 is below 40, and the ratio of the values at fusion temperatures of 130 and 160°C is at most 1.5.

33. A process for forming an image according to Claim 32 wherein the ratio of haze values is at most 1.3.

34. A process for forming an image according to Claim 33 wherein the ratio of haze values is at most 1.2.

35. A process for the manufacture of a toner for developing an electrostatic image comprising toner particles which include a binder resin, a wax and a colorant, wherein the

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wax has a melting point of between 50 to 150°C; and the wax exists in the toner particles in domains of 2μm or less mean particle size and wherein

(a) the mean circularity of the toner particles as measured by a Flow Particle Image Analyser is at least 0.90; and

(b) the shape factor, SF1, of the toner particles is at most 165,

which process comprises the following steps:

I. providing a latex dispersion which has at least one latex with a monomodal molecular weight distribution and has at least one latex with a bimodal molecular weight distribution;

II. providing a wax dispersion;

III. providing a colorant dispersion

IV. mixing the latex dispersion, wax dispersion and colorant dispersion; and

V. causing the mixture to flocculate.

36. A process according to Claim 35 wherein the monomodal molecular weight latex has a number average molecular weight of from 3000 to 10000.

37. A process according to Claim 36 wherein the monomodal molecular weight latex has a number average molecular weight of from 3000 to 6000.

38. A process according to any of Claims 35 to 37 wherein the bimodal latex has a weight average molecular weight of from 100,000 to 500,000.

39. A toner according to Claim 38 wherein the bimodal latex has a weight average molecular weight of from 200,000 to 400,000.

40. A process according to any of claims 35 to 39 further comprising heating the flocculated mixture obtained after step (v) to form loose aggregates of particle size from 3 to 20μm.

41. A process according to Claim 40 further comprising heating the aggregates to a temperature above the T_g of the latex to induce coalescence to form toner particles.

42. A process according to Claim 41 further comprising blending the toner particles with one or more surface additives.

43. A process according to any one of Claims 35-42 wherein the latex dispersion comprises an ionic surfactant.

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44. A process according to any one of claims 35-43 wherein the latex containing a resin having a bimodal molecular weight distribution is prepared by a process comprising the successive steps of forming a polymer of high molecular weight distribution followed by forming a polymer of low molecular weight distribution such that the resulting latex comprises composite particles comprising both said low molecular weight polymer and said high molecular weight polymer.

46. A process according to any one of Claims 35 to 44 which, prior to step iv, further comprises the step of providing a charge control agent dispersion, which dispersion is then incorporated in step iv by mixing.

46. A process according to claim 45 wherein the charge control agent is colourless.

47. A process according to claims 45 or 46 wherein the charge control agent is milled with the colorant.

48. A process according to any one of claims 35 to 47 wherein the preparation of the wax dispersion comprises the mixing together of the wax with an ionic surfactant.

49. A process according to any of claims 35 to 48 wherein the preparation of the colorant dispersion comprises the milling together of the colorant with an ionic surfactant.

50. A process according to claims 43, 48 and 49 wherein the dispersions of latex, colorant, wax, and charge control agent where present, have the same sign charge on the surfactant.

51. A process according to claim 50 wherein the surfactant present in the dispersions contains a group which can be converted from an ionic to a non-ionic form and vice versa by adjustment of pH.

52. A process according to claim 51 wherein the surfactant contains a carboxylic acid group and the dispersions are mixed in step (iv) at neutral to high pH and the flocculation step (v) is then effected by reduction of pH.

53. A process according to claim 51 wherein the surfactant contains a tertiary amine group and the dispersions are mixed in step (iv) at neutral to low pH and the flocculation step (v) is then effected by increase of pH.

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54. A process according to any one of claims 42-53 wherein the surface additives comprise one of the following: (i) hydrophobised silica ; (ii) large and small particle size silica which may optionally be hydrophobised (iii) hydrophobised silica and one or both of hydrophobised titania and hydrophilic or hydrophobised alumina ; (iv) large and small particle size silica and one or both of hydrophobised titania and hydrophilic or hydrophobised alumina.

55. A toner for developing an electrostatic image which has been obtained by the process of any one of claims 35-54.